Outbreaks To Remember West Virginia, 2011-2012

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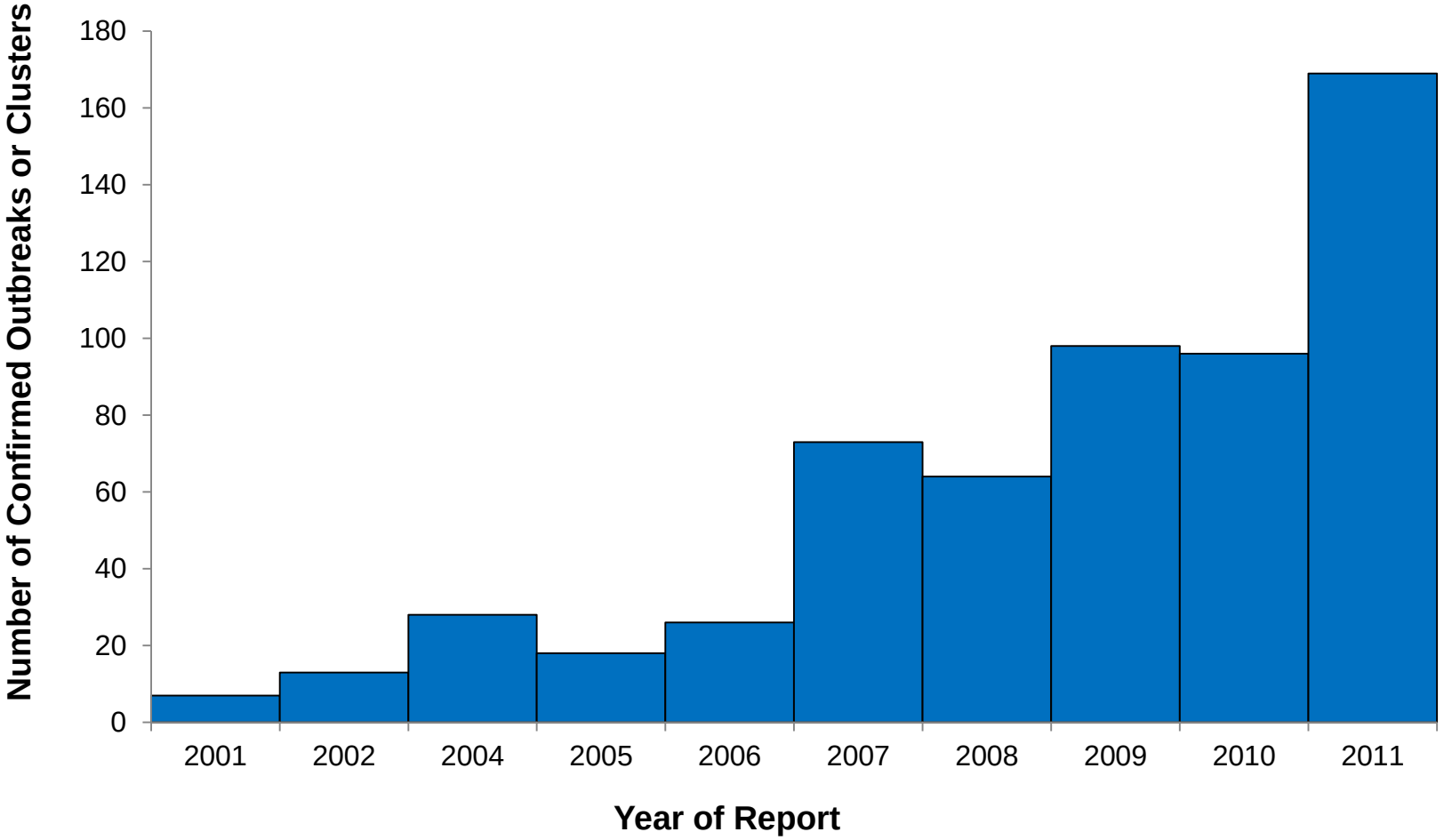
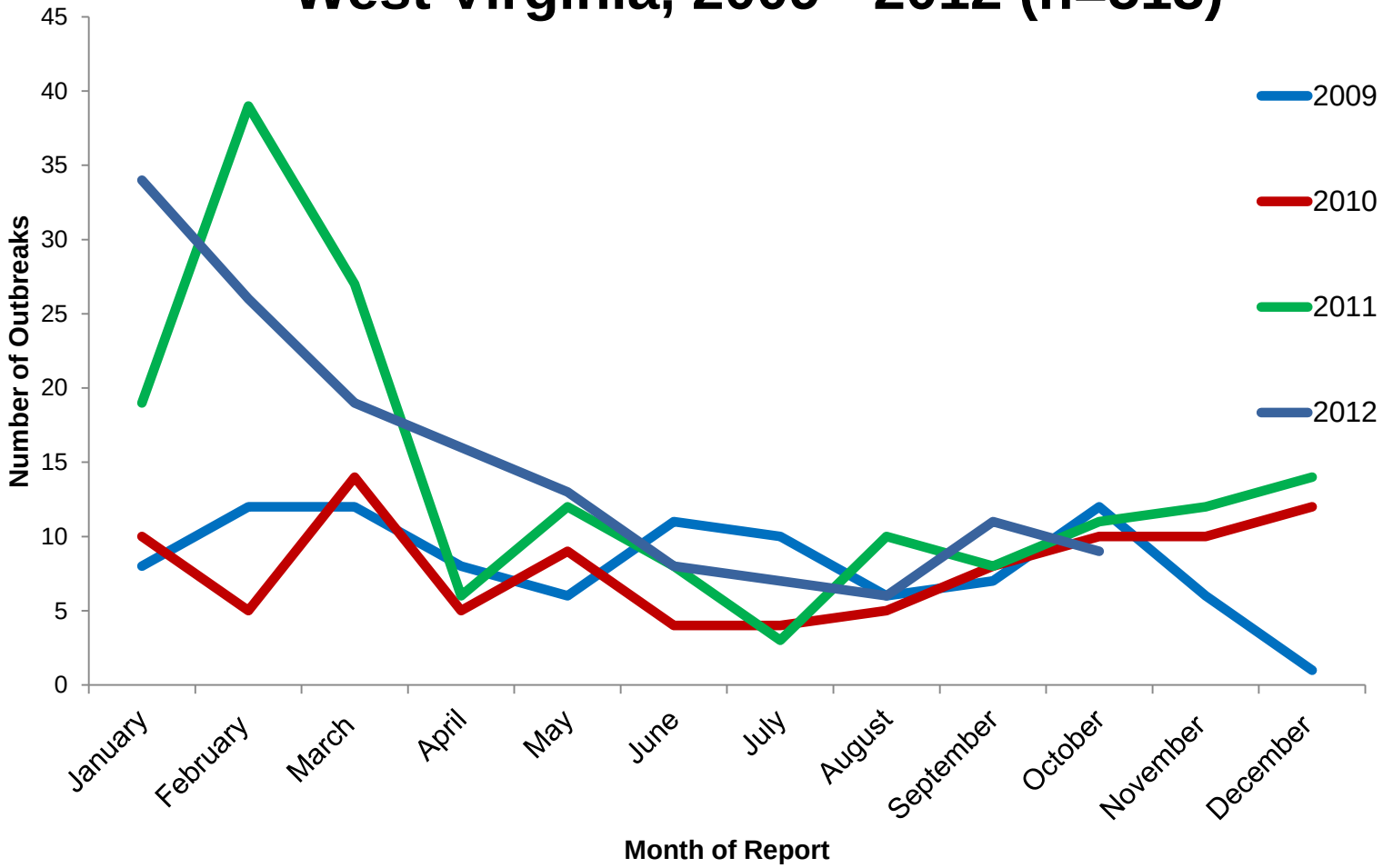
Objectives

- Outbreaks in WV over last decade
- Outbreaks in 2011
- Outbreaks to remember:
  - Outbreak of novel influenza A (H3N2)v
  - Regional outbreak of Multidrug Resistant *Acinetobacter baumannii*
  - Situational update on the fungal meningitis outbreak

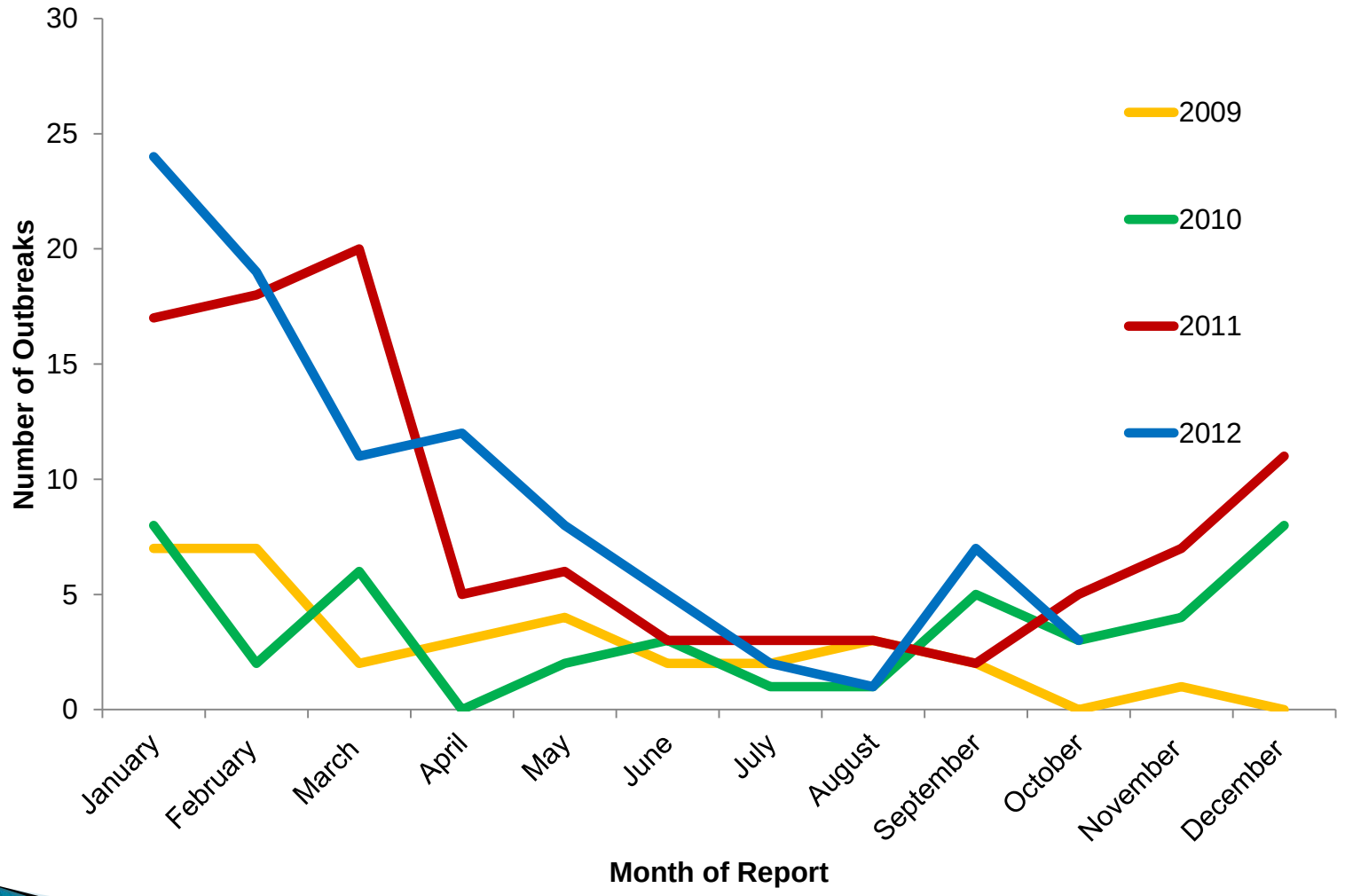
Confirmed Outbreaks or Clusters, West Virginia, 2001 - 2011 (n=592)



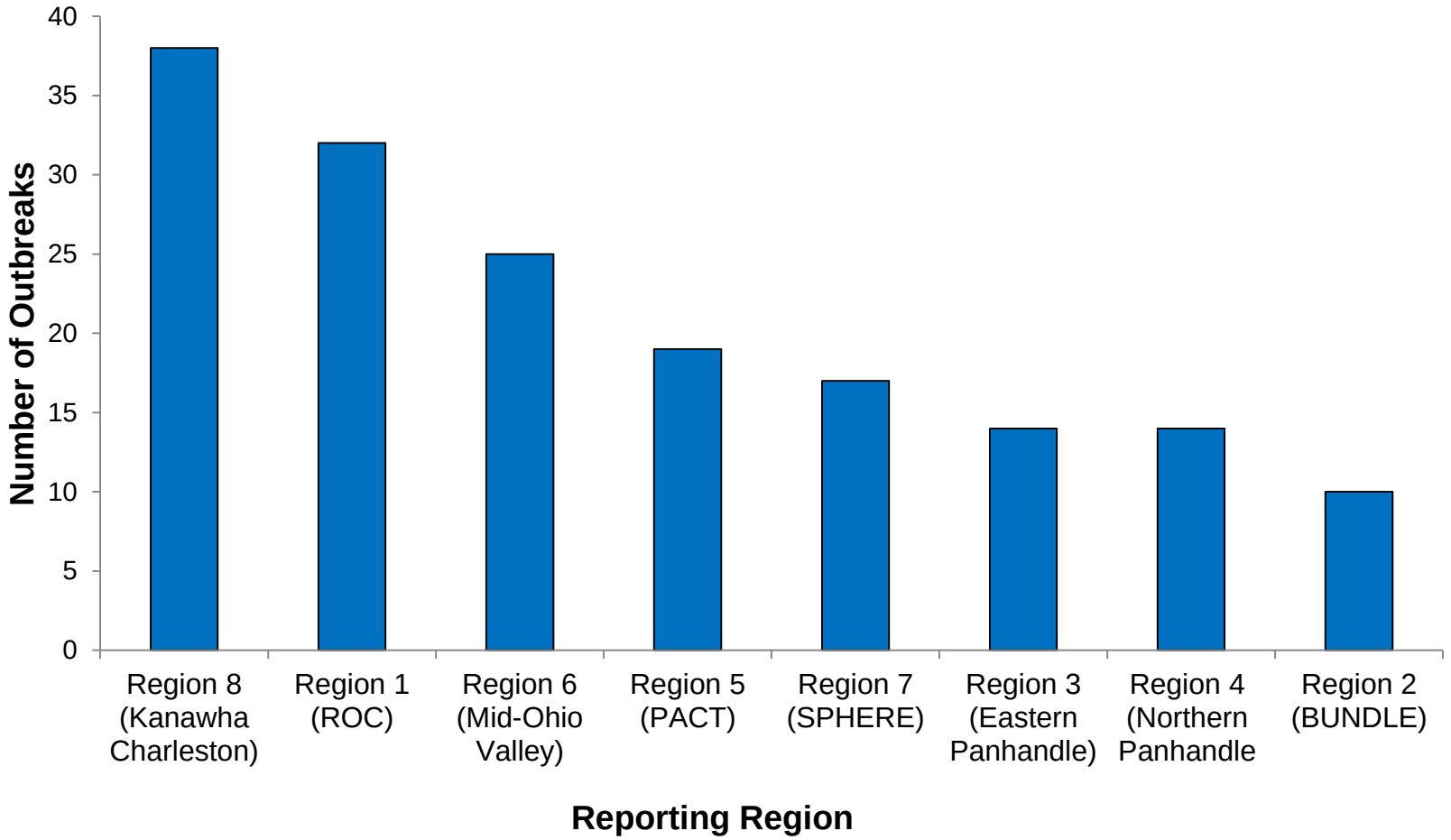
Confirmed Outbreaks by Month of Report
West Virginia, 2009 - 2012 (n=513)



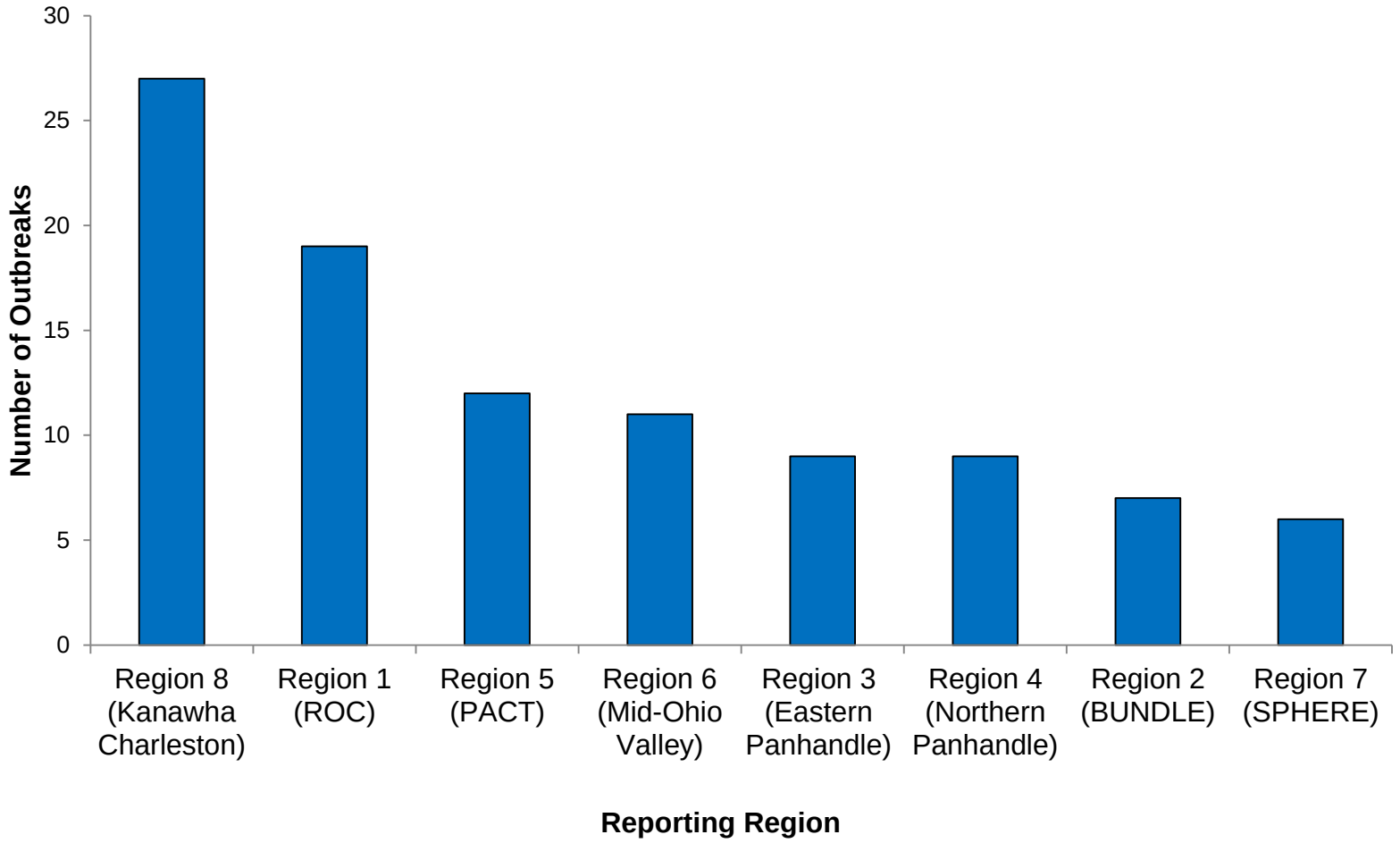
Confirmed Healthcare-Associated Outbreaks by Month of Report, West Virginia, 2009 - 2012 (n=268)



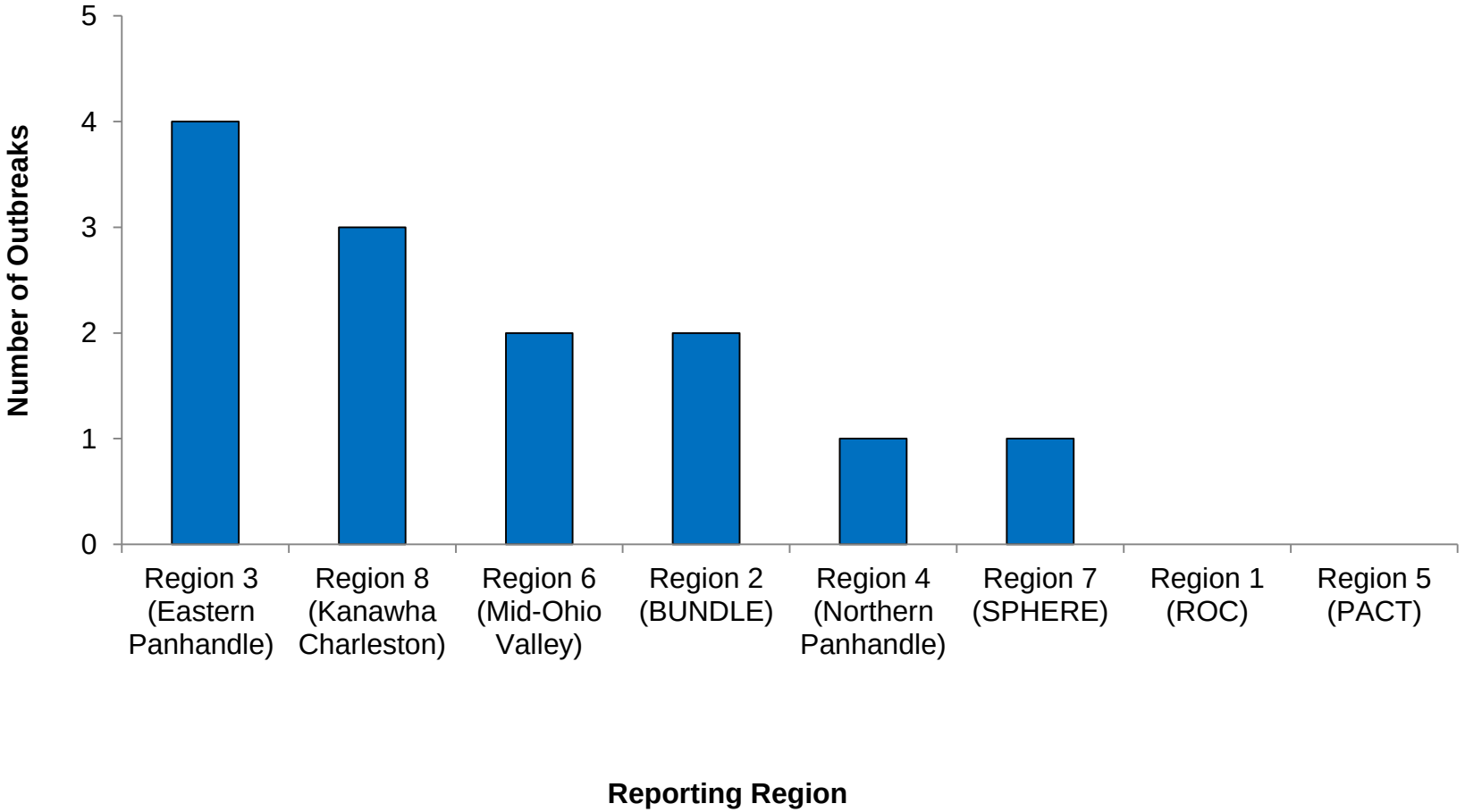
Confirmed Outbreaks Reported by Region, West Virginia, 2011 (n=169)



Healthcare-Associated Outbreaks by Reporting Region, West Virginia, 2011 (n=100)



Multi-Drug Resistant Organisms (MDROs) By Reporting Region, West Virginia, 2011 (n=13)



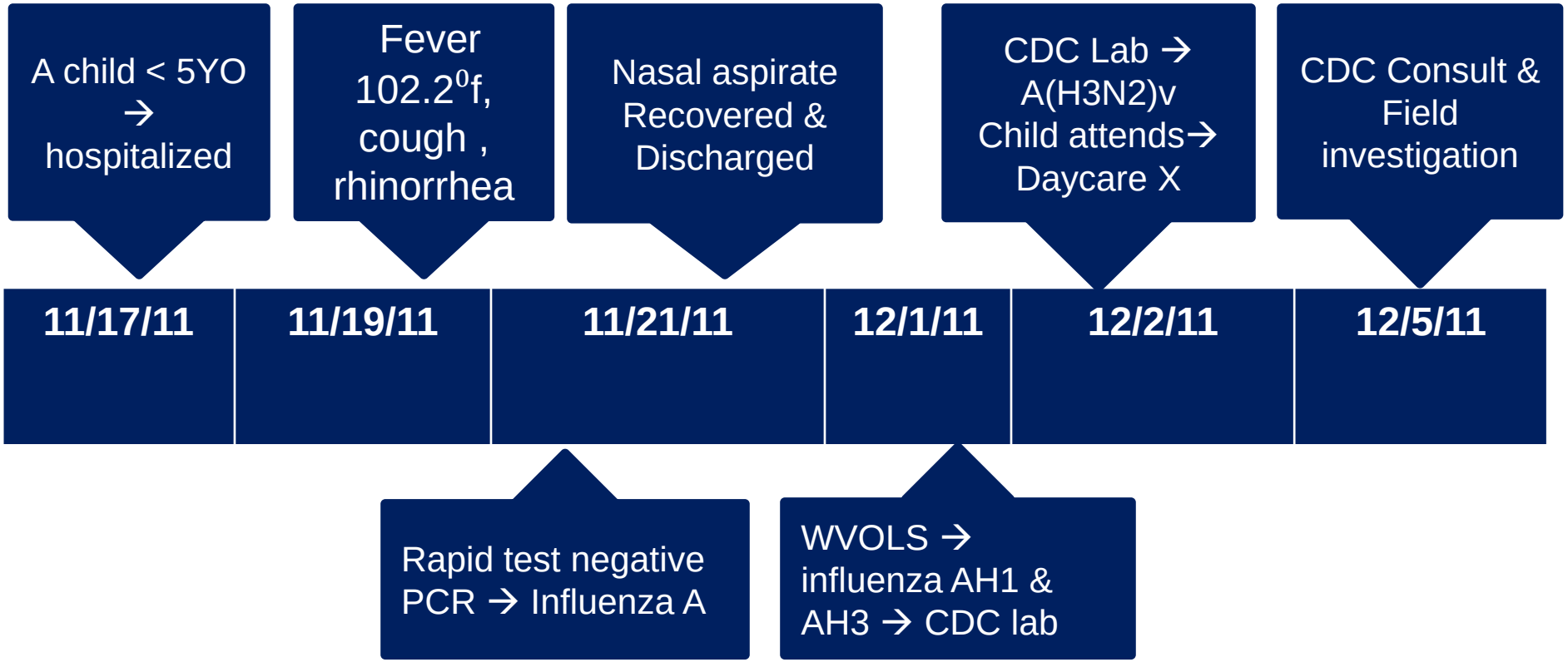
Outbreak of Novel Influenza A (H3N2)v

West Virginia, December, 2011

Background

- Novel influenza virus of animal origin
  - pandemic → efficiently transmitted "person-to-person"
  - Recent pandemic → 2009 novel H1N1
- Since 2005→1-2 cases/year of swine origin influenza
- Between Aug & Dec, 2011 →12 cases swine origin influenza A (H3N2)v
  - The virus → has the matrix (M gene) from 2009 H1N1
  - The 12 Cases:
    - 5 states including WV
    - 11/12 were in children
    - 6/12 → identified recent exposure to swine
    - 3 hospitalizations and no deaths

Initial Outbreak Timeline



Investigation Objectives

- Determine the extent of the outbreak
- Identify new cases
- Identify the source of infection
- Prevent further spread

Methods: Case Definition

- Clinical criteria:
  - Less than 5YO: fever, sore throat, cough, runny or stuffy nose or shortness of breath with onset dates between Nov. 9 & Dec. 24, 2011
  - More than 5YO: fever of ≥ 100 °F, and cough and/or sore throat with same onset dates
- Laboratory criteria: positive for influenza A(H3N2)v
- Confirmed case → clinical & lab criteria
- Probable case → clinical criteria.

Methods (Case Finding Activities)

- **Active surveillance at the daycare**
  - Retrospective surveillance: phone interviews with parents and staff using a standardized questionnaire
  - Prospective surveillance:
    - Daily screening of attendees and absentees for respiratory symptoms using a standardized form
    - Phone interviews and referral for testing, if indicated

Methods (Case Finding Activities)

- **Community-based surveillance**
  - Active surveillance was initiated in other daycares
  - Direct outreach to local emergency department
  - Recruited two additional sentinel providers
  - A regional health advisory on Dec. 9, 2011
  - A statewide health advisory on Dec. 23, 2011
  - Notified neighboring states

Methods (Laboratory)

- NP swabs were collected at
  - Local hospital laboratory
  - Local ED
  - Sentinel providers
- Specimens → WVOLS for RT-PCR testing
- Positive & negative specimens→ CDC lab
- CDC lab tested for influenza & non-influenza respiratory viruses (NIVs)

Results (Daycare Surveillance)

- Daycare X at the time of investigation
  - 68 attendees (2-12 YO) and 14 staff members
  - 5 days a week
  - Young children attended during the day
  - Older children attended before and after school
- A 2nd confirmed case was identified
  - Onset date → Nov. 29, 2011
  - Specimen was collected Dec. 7, 2011
  - Received by CDC Dec. 14 & reported on Dec.16

Results (Daycare Surveillance)

	Total	Interviewed	Cases	Confirmed	Probable
Attendees	68	52/68 (76%)	26/52 (50%)	2/26 (8%)	24/26 (92%)
Staff	14	14 (100%)	0 (0)	0	0

- Among ill children (n=26)
  - 11 of 26 (42%) were female
  - Age range was 2 to 8 years with a mean (median) 4 (3)
  - Dates of onset range between Nov. 15 & 30
  - Days between cases ranged 0 to 5 days mean (median): 2(1) days.
  - Only 16/26 (62%) met the standard ILI case definition
- Reported temperature (n= 19)
  - Mean (median) 102 (101) °F
- Duration of illness (n= 12)
  - Mean (Median) 8 (6) days

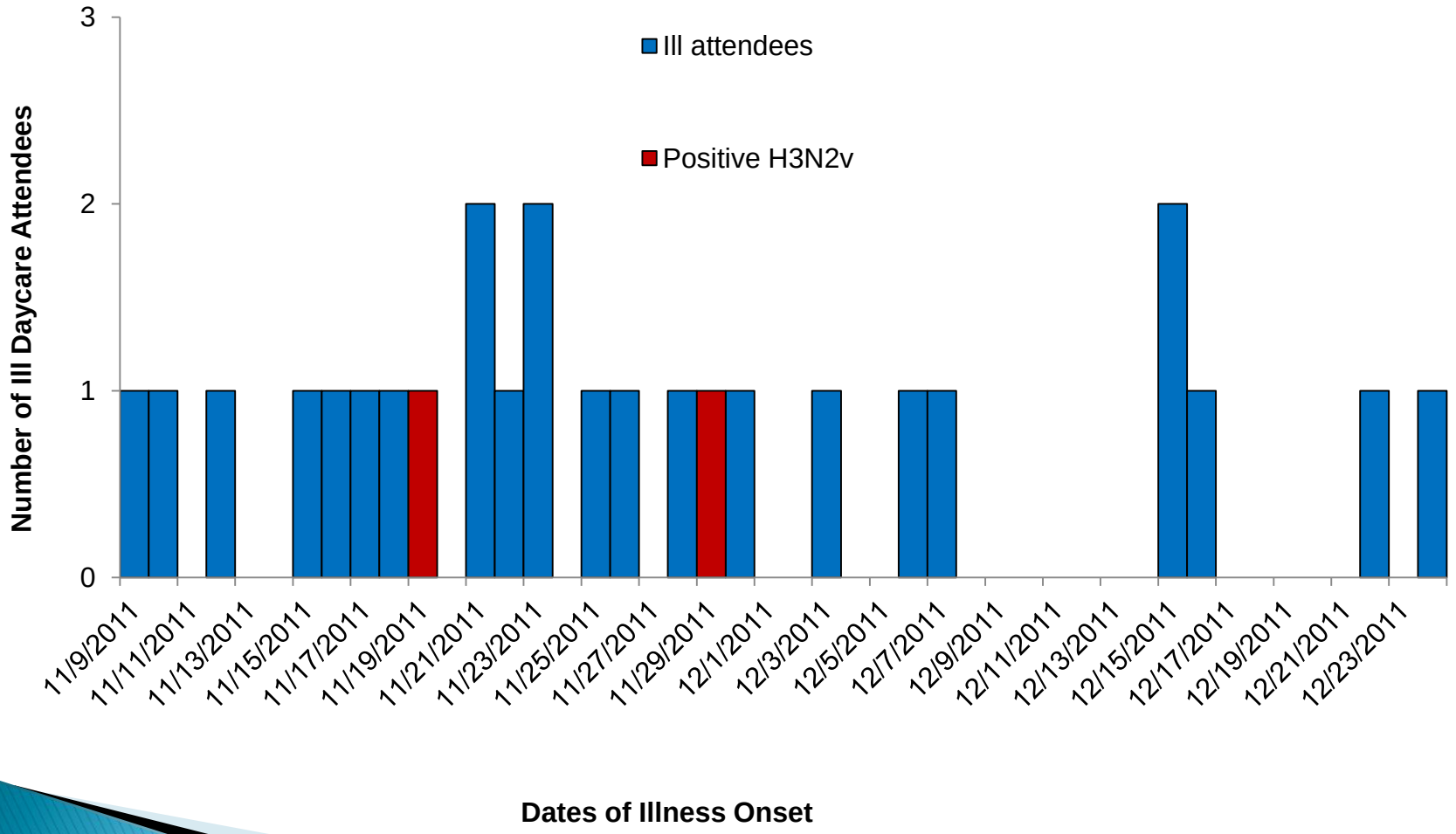
Results (Daycare Surveillance)

Symptoms of ill children of daycare X, West Virginia, 2011 (n=26)

Symptoms**	Number	Percentage
Fever*	20	77
Cough	20	77
Sore throat	7	27
Runny nose/congestion	8	31

*Fever was self-reported
**Could report more than one symptom

Confirmed and Probable Cases of Upper Respiratory Illness in Daycare X, WV November 9 and December 24, 2011 (N=26)



Results (Community Surveillance)

- 25 patients identified in the community unrelated to Daycare X → Lab specimens
- Due to limited resources, minimal data was collected on these individuals
- Age ranged from 0 to 80 years with a mean (median) 23 (12) years

Results (Laboratory)

- Dec 7 - 25 → 38 specimens → OLS & CDC
- 11 specimens from daycare attendees:
  - 2 (18%) were positive for influenza A (H3N2)v
  - 9 (82%) were negative for both influenza A & B
  - 6 were tested for NIVs
    - 2 → negative
    - 4 → positive for 1 or more viruses
      - 3 → adenovirus
      - 2 → rhinovirus
      - 1 → parainfluenza type 4

Results (Laboratory)

- 2 daycare-related specimens (staff & family member) → negative

- 25 specimens collected from the community
  - 25 (100%) → negative for both influenza A and B
  - 13/25 (52%) → positive results for one or more NIV

Results (Laboratory)

Results of NIVs testing from community members unrelated to Daycare X, N=25

Positive for non- influenza viruses (n=25)	Number of Patients
Adenovirus (AdV)*	2
Parainfluenza virus (PIV 1)*	4
Respiratory syncytial virus (RSV)	3
Parainfluenza virus (PIV 4)*	3
Human bocavirus (HBov)	1
Rhinovirus (RV)*	0
Human coronavirus 229E	1
Negative	12

*positive for more than one virus in specimen

Conclusion

- Nov. 9 & Dec. 25, 2011→ 26 cases of upper respiratory illness (URI) among daycare X attendees
- Attack rate of 50%.
- Mild illness → no hospitalizations or deaths
- Only 2 were positive for A (H3N2)v
- 10 days between the onset dates of two confirmed cases → 2 to 5 generations of transmission
- No contact with swine or farm animals → person-to-person transmission in the daycare

Conclusion

- No ill staff & low secondary attack rate (6%) among households → highly inefficient transmission →consistent with other states
- No cases of influenza A (H3N2)v were identified among persons in the community unassociated with the daycare.
- Not all URI can be attributed to influenza A (H3N2)v → high prevalence of NIVs
- Sensitive case definition → inefficient & strain already limited resources
- Timely results of laboratory testing → resources use & allocation

Limitations

- This outbreak was investigated in retrospect:
  - Index case was recognized 13 days after onset
  - The second confirmed case was tested 8 days after onset
  - 21 cases occurred before field investigation started
- Delay in testing→ samples collected 0-21 days after onset with a mean (median) of 8 (5) days → underestimate influenza infection in this population
- Incomplete response rate and recall bias
- Occasionally, missing data → underestimation of the prevalence of signs and symptoms among ills

Recommendations

- Identifying novel influenza is a crucial surveillance function:
  - Typing early season and outbreak isolates is critical
  - Sentinel providers and hospital lab can play an active role
- Routine training on outbreak investigation, active surveillance and structured patients interview
- Active surveillance should be structured and focused
- Prioritization of activities is critical when resources are limited
- Lab testing is crucial in outbreak investigation (respiratory)
  - Federal Express account for shipping during critical investigations
  - PCR Multiplex for NIVs

Influenza A (H3N2)v in 2012

States Reporting H3N2v Cases	Cases in 2011	Cases in 2012
Hawaii		1
Illinois		4
Indiana	2	138
Iowa	3	
Maine	2	
Maryland		12
Michigan		6
Minnesota		4
Ohio		107
Pennsylvania	3	11
Utah		1*
West Virginia	2	3
Wisconsin		20
Total	12	307

Regional Outbreak of Multidrug Resistant *Acinetobacter baumannii*, West Virginia, 2012

Acinetobacter baumannii (Ab)

- Non-motile gram negative bacteria
- Widely distributed in nature (soil, water, food, sewage)
- Nosocomial pathogen with a propensity to develop antimicrobial resistance
- Mechanical ventilation and chronic wounds
- Long survival time on inanimate surfaces.
- Causes extensive environmental contamination
- Most common gram negative bacteria carried by skin of HCP
- MDR-Ab outbreaks → mortality rates 75%

The Outbreak

- Summer 2012, DIDE, LHDs, Regional Epidemiologist (RE), IPs from acute care and LTCFs→ ongoing regional meeting→ CRE outbreak (Carbapenem-resistant *Enterobacteriaceae*)

- Concerns about increasing number of patients with multidrug-resistant *Acinetobacter* (MDR-Ab)

- Outbreak investigation started → acute care facilities, outpatient clinic and LTCFs

The Investigation

- Consultation with CDC
- DIDE & RE → initiated investigation
  - Focus on two acute care facilities and one outpatient clinic
- Objectives:
  - Determine the extent of the outbreak
  - Identify additional cases of MDR-Ab
  - Identify possible sources of the outbreak
  - Characterize risk factors for transmission
  - Provide recommendations to prevent further spread

Methods: Case Definition

- A patient admitted to hospital A or B with a first positive culture for MDR-Ab between January and August, 2012
- MDR-Ab is defined as Ab that is resistant to three or more of the following five antimicrobial classes:
  - Antipseudomonal cephalosporins (ceftazidime or cefepime)
  - Carbapenems (imipenem or meropenem),
  - Ampicillin/sulbactam,
  - Fluoroquinolones (ciprofloxacin or levofloxacin),
  - Aminoglycosides (Gentamicin, amikacin).

Methods: Epidemiologic

- Demographic, clinical and risk factors
- Data→ entered and analyzed in Microsoft Excel
- Descriptive analysis to evaluate
  - Patient demographics
  - Reasons for admission to Hospital A & B
  - Time between admission and culture collection
  - Admitting source
  - Common risk factors
- A state-wide health advisory

Methods: laboratory

- Retrospective review of the incidence of MDR-Ab in hospital A & B
  - Hospital A & B Lab
  - Commercial Lab
  - Out-of-state Lab
- Clinical isolates from both hospitals →CDC laboratory for molecular typing
- Environmental cultures → CDC

Methods: Site Visits

- Site visits to Hospitals A & B
  - Staff interviews (medical, admin, IPs, respiratory therapists, head nurses, wound care, specialty units, environmental)
  - Policies and procedures
  - Observational studies
    - Wound care practices
    - Respiratory therapy practices
    - Environmental cleaning

Methods: Site Visits

- Site visits to Hospitals A & B
  - A walk-through the facilities to evaluate
    - Hand hygiene
    - Isolation supplies
    - Equipment used in patient's care (medication, vital signs, and respiratory carts)
- Environmental cultures

Methods: Site Visits

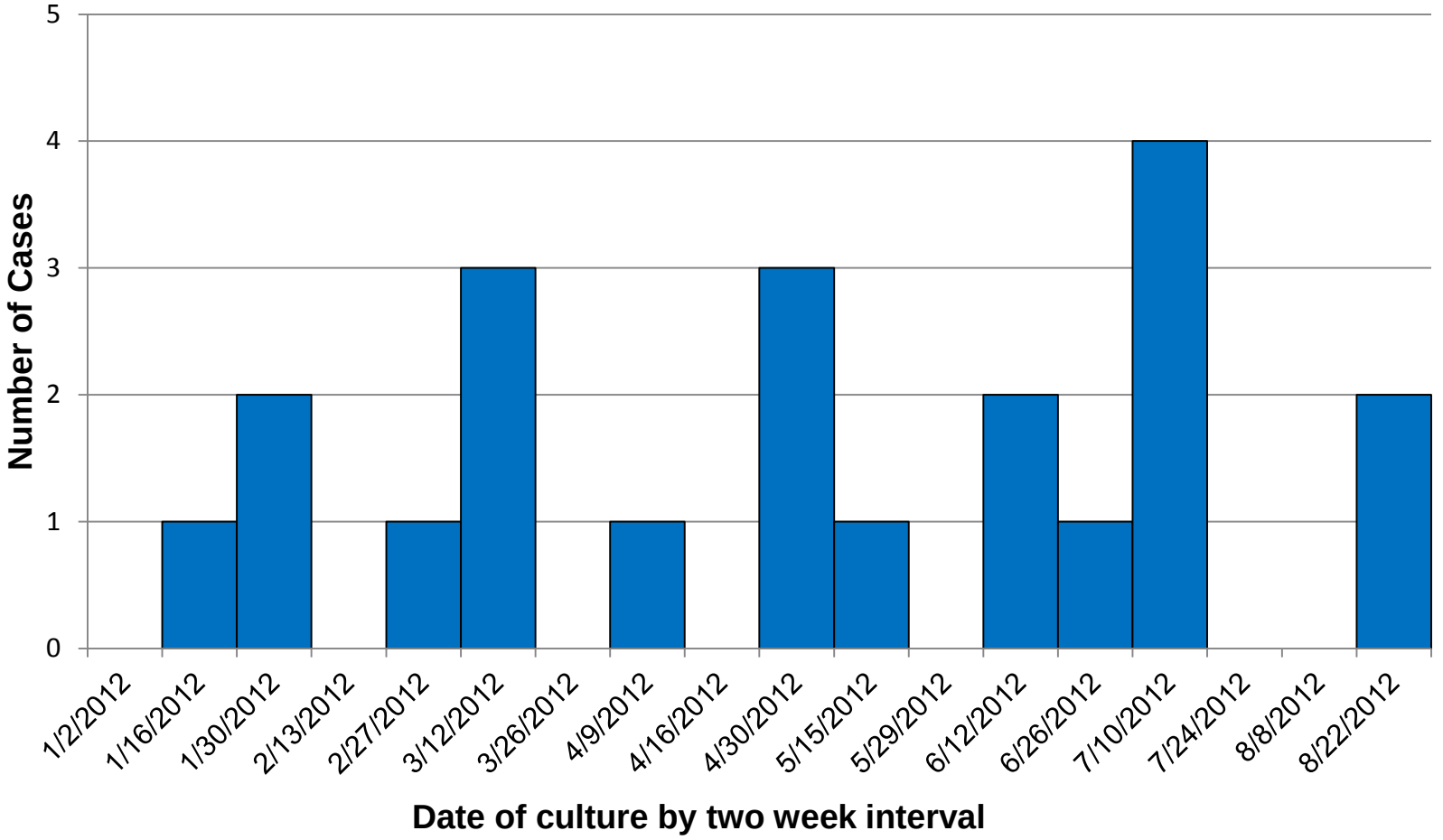
- Site visit to Clinic A
  - Interviewed staff
  - Policies and procedures
  - Walk-through the clinic
  - Observation
    - Patient flow
    - Wound care practices
    - Environmental cleaning
    - Special radiologic procedure room
  - Environmental cultures: 11 specimens →CDC lab

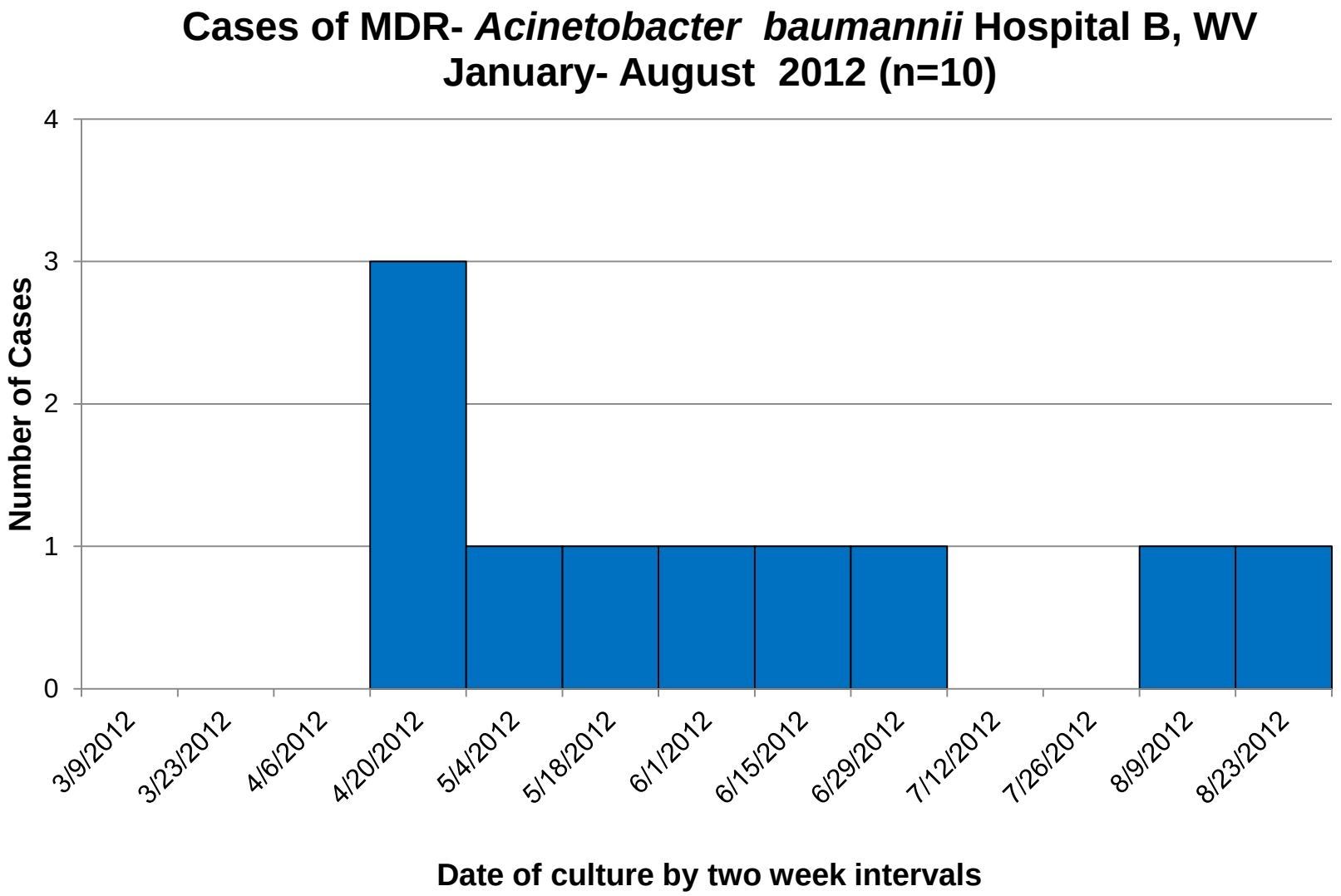
Results: Epidemiology

Total case-patients	Hospital A	Hospital B
Total patients identified*	28	18
- Previously know positive	5	4
- Not admitted	2	4
Total patients met case definition	21	10

*At least over 25% of the total patients identified in Hospital A & B were seen in Clinic A and 75% have chronic wounds

Cases of MDR-*Acinetobacter baumannii* from Hospital A, WV, January-August, 2012 (n=21)




Cases of MDR- Acinetobacter baumannii Hospital B, WV
January- August 2012 (n=10)
Number of Cases
0
1
2
3
4
3/9/2012
3/23/2012
4/6/2012
4/20/2012
5/4/2012
5/18/2012
6/1/2012
6/15/2012
6/29/2012
7/12/2012
7/26/2012
8/9/2012
8/23/2012
Date of culture by two week intervals

Results: Epidemiology

Demographics: Case-Patients Hospitals A and B

Demographics	Hospital A (n=21)	Hospital B (n=10)
Age mean (median)	65.8 (61)	67.7(76)
Gender :		
Male	9 (43%)	4(40%)
Female	12 (57%)	6(60%)

Potential Risk Factors for Infection with MDR-Ab, among Case-Patients Hospital A & B

Variable	Hospital A (n=21)	Hospital B (n=10)
Admitting source ▪ Home ▪ LTCFs ▪ Other	 10 (48%) 11 (52%) 0 (0)	 4 (40%) 5 (50%) 1 (10%)
Mean (median) length of stay at hospital A or B before positive culture collection	4.8 (1)	3.1 (0.5)
Admission to Hospital A during the 3 months prior to positive culture	17 (81%)	2 (20%)
Admission to Hospital B during the 3 months prior to positive culture	1 (4.7%)	2 (20%)
Wounds at the time of admission	13 (62%)	9 (90%)
ICU stay during the incident admission	9 (43%)	1 (10%)
Reason for admission to hospital A or B ▪ Wound care ▪ Pneumonia or other respiratory issues ▪ Other	 12 (57%) 4 (19%) 5 (21%)	 9 (90%) 1 (10%) 0 (0)

Results: Hospital A

Infection Control Practices

- System to identify MDROs patients → only works if the physician records the information
- Hand Hygiene: available in the patient rooms but not hallways
- Isolation procedures
  - Isolation carts or wall-mounted isolation units → not located near isolation rooms
  - Flow of contact isolation procedures is difficult to follow
  - No routine cohorting of MDR-AB patients→ no private rooms
- Medication cart
- Vital signs cart (deposable blood pressure cuff)
- One critical care unit → saline bottles, supplies → stored on a window sill next to a sink

Results: Hospital A

Wound care observation

- Education and training → new employee orientation
- Wound care is provided under physician orders
- No special wound care team
- Very few irrigation or whirlpool treatments
- 4 observations were completed in different units
- Few lapses in infection control (HH, PPE, marker)

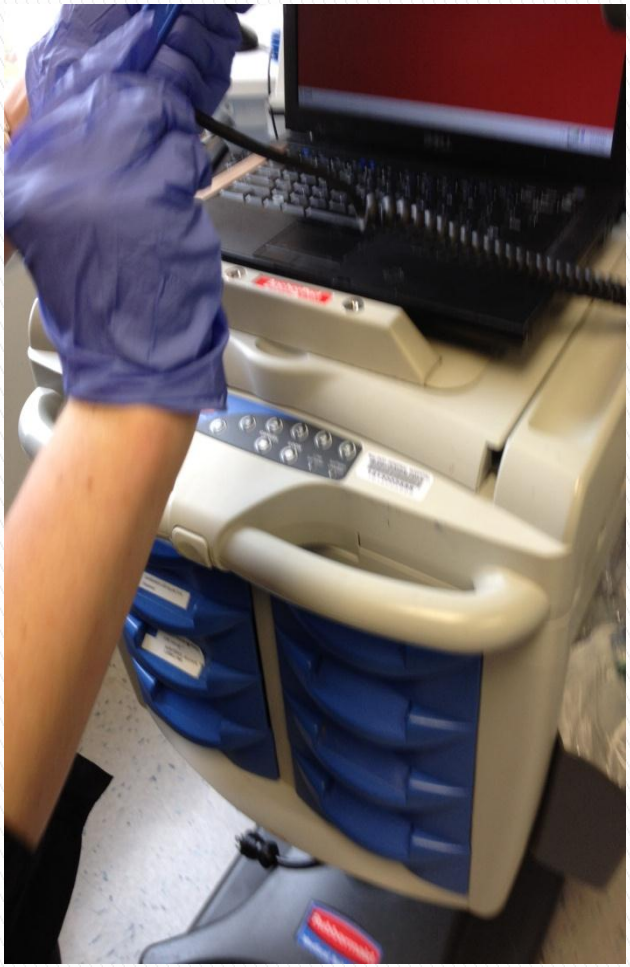
Respiratory therapy practices' observation

- Respiratory cart (supplies, meds, scanner)
- Infection control lapses (HH, PPE, trash bag)
- Staff are responsible on cleaning ventilator

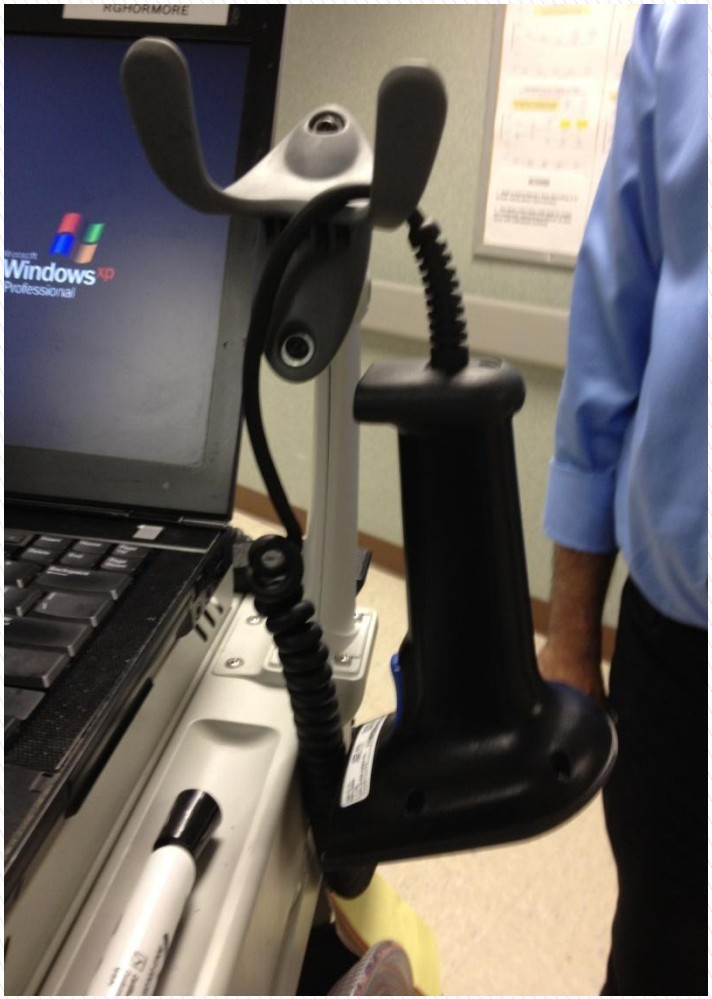
Results: Hospital A

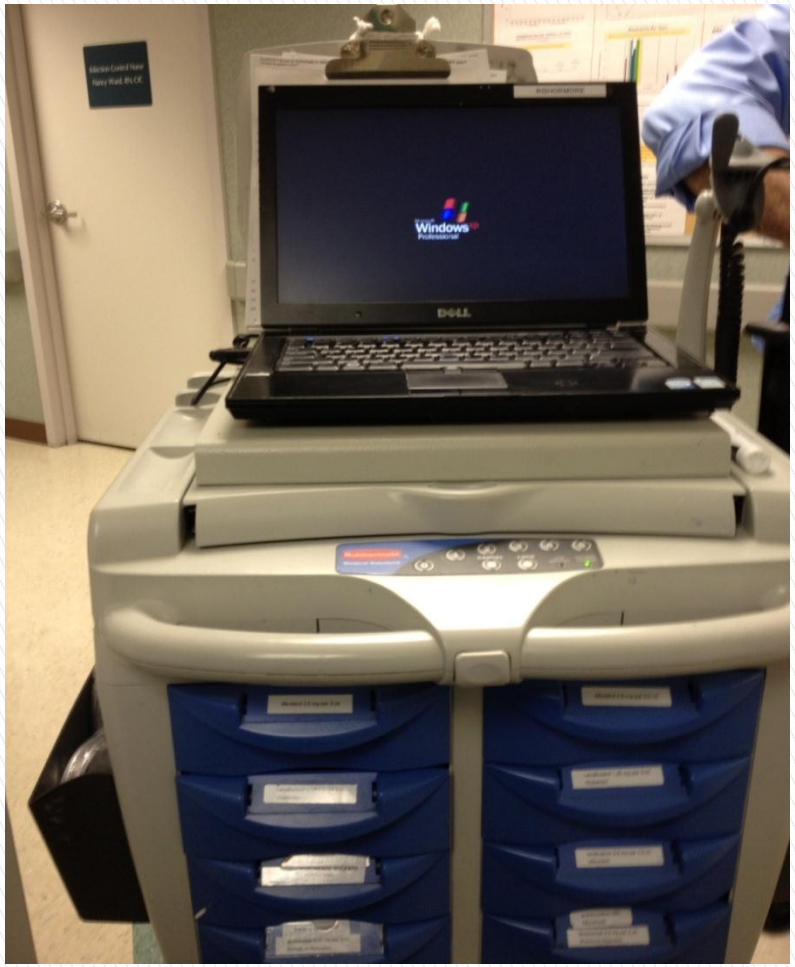
Environmental cleaning observation

- Routine monthly monitoring
- Generally good compliance (isolation procedures, PPE, contact time for cleaning solutions)
- Cleaning carts stay in the hallway → lock and unlock their supply carts to access locked cleaning solutions



Respiratory cart





Medication cart

Vital signs cart

Results: Hospital B

General infection control practices

- Paper record
- Med cart → no scanner and not rolled into patient's room
- Vital signs cart
  - vital packet (thermometer, BP kit, and stethoscope) for isolation rooms
- HH and isolation supplies are more accessible in the remodeled parts of the facility

Respiratory therapy practices' observation

- Few lapses in HH and isolation procedures
- Respiratory cart → not rolled in the patient's room

Results: Hospital B

Environmental cleaning observation:

- Routinely monitor compliance
- Cleaning cart stocked with supplies → not rolled in patient's room
- Cleaning solutions and mops are changed every 3 rooms or immediately in isolation rooms
- Difficulties in cleaning commonly touched surfaces during daily cleaning
- Few lapses in HH

Wound care practices' observation:

- Outpatient wound care
  - No observation was done
  - Care is provided by a wound care team as per physician orders
- Inpatient wound care:
  - Observation → few lapses in HH
  - Care provided by nurses
  - Forming an inpatient wound care team

Results: Clinic A

Clinic A description:

- Provides general surgery and a subspecialty surgical services
- Opens 5-days/ week and serves 50 patients/day
- 3 physicians, 2 PAs, 1 LPN and ancillary staff
- 4 exam, 1 storage, 1 dirty utility, 1 radiology and 1 receptionist rooms

Surveillance

- Cultures on all new patients and as needed
- No system to track MDROs

Medication use

- No intravenous fluids, antimicrobials, or any other medications
- Only intramuscular antimicrobials are occasionally given
- No anesthesia or intravenous sedation
- Occasionally central venous catheters (CVCs) are accessed for flushing
- Some medications used in wound care are used in multiple patients
- Wound care medications are kept in a cabinet in the wound care examination room.

Results: Clinic A

Wound care practices' observation

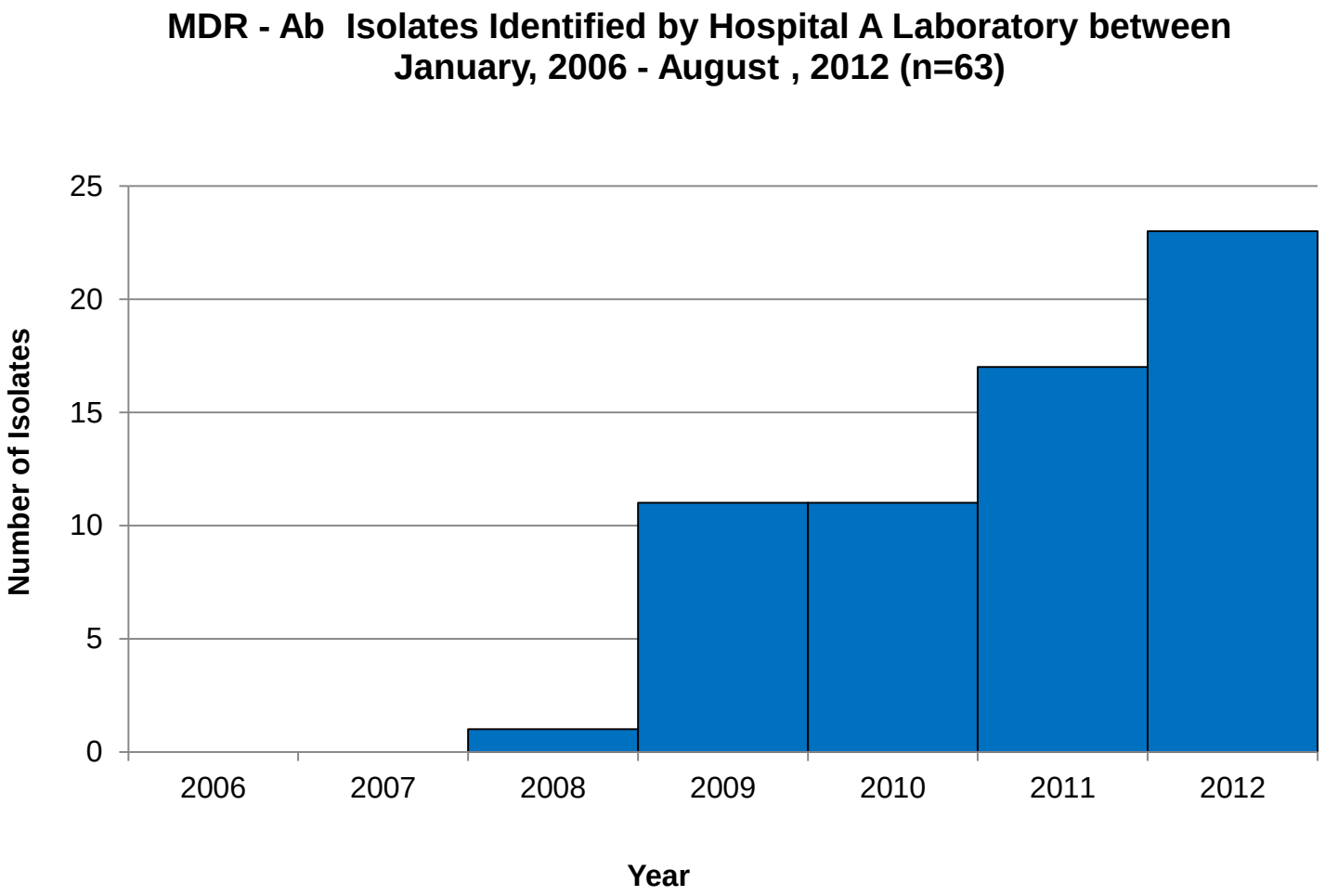
- Only minor debridement and dressing are done
- Major debridement are done at hospital OR
- Few lapses in infection control practices
- Instrument used were disposable
- Gauze used was from a non-sterile gauze canister located in the countertop
- Few reusable instruments → nearby facility for sterilization

Environmental cleaning procedure and observation

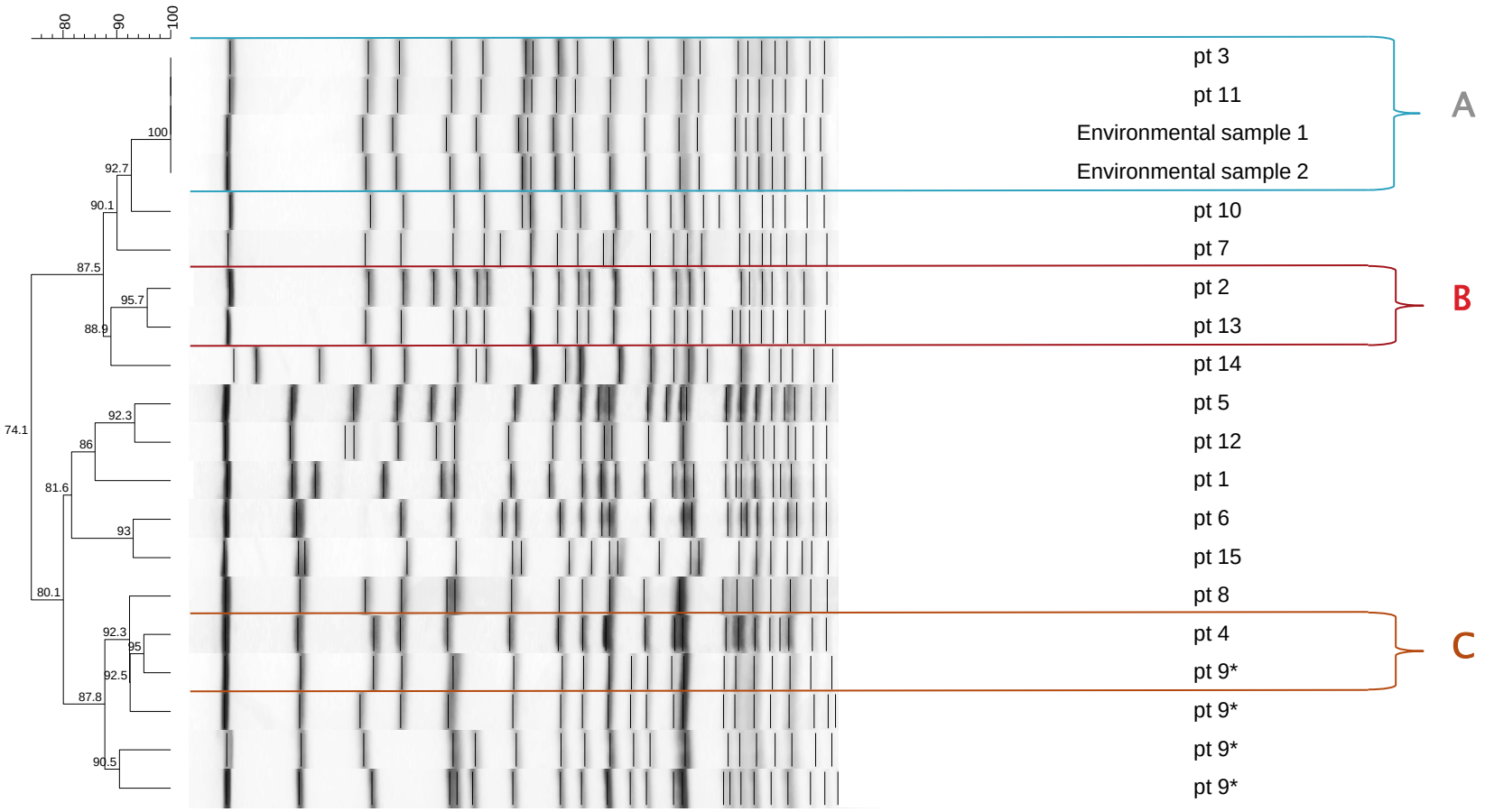
- In-between-patients cleaning is done by the staff
- Terminal cleaning → nearby facility ?
- Some lapses in infection control practices → in-between patients

Results: Clinic A

Results: Laboratory



Laboratory: CDC



^ Isolates with a >95% similarity in PFGE band patterns were considered closely related

Conclusion

- A widespread, long-standing regional outbreak involving multiple healthcare facilities
- Not a common source outbreak
- Most patients are exposed to multiple healthcare facilities
- Chronic wound infection is the primary risk factor
- Multiple infection control issues that may have contributed to MDR-Ab transmission

Limitations

- Only descriptive data→ limits our conclusion
- Epidemiologic data → incomplete
- Retrospective lab data for hospital B could not be collected
- Observation studies were limited to few activities → difficult to generalize
- Infection control practices were not assessed in other healthcare facilities → LTCFs or home health agencies
- Limited PH resources → log-term follow up of MDROs outbreaks

Recommendations

- Administrative support is critical to control this outbreak
- Communication and Education (staff, patients, families)
- Ongoing surveillance of MDR-Ab
  - Identify a mechanism to track MDRO status in patient records
  - Communicate patient MDRO status with staff, families and other healthcare facilities upon transfer
- Cohort patients and cohort staff

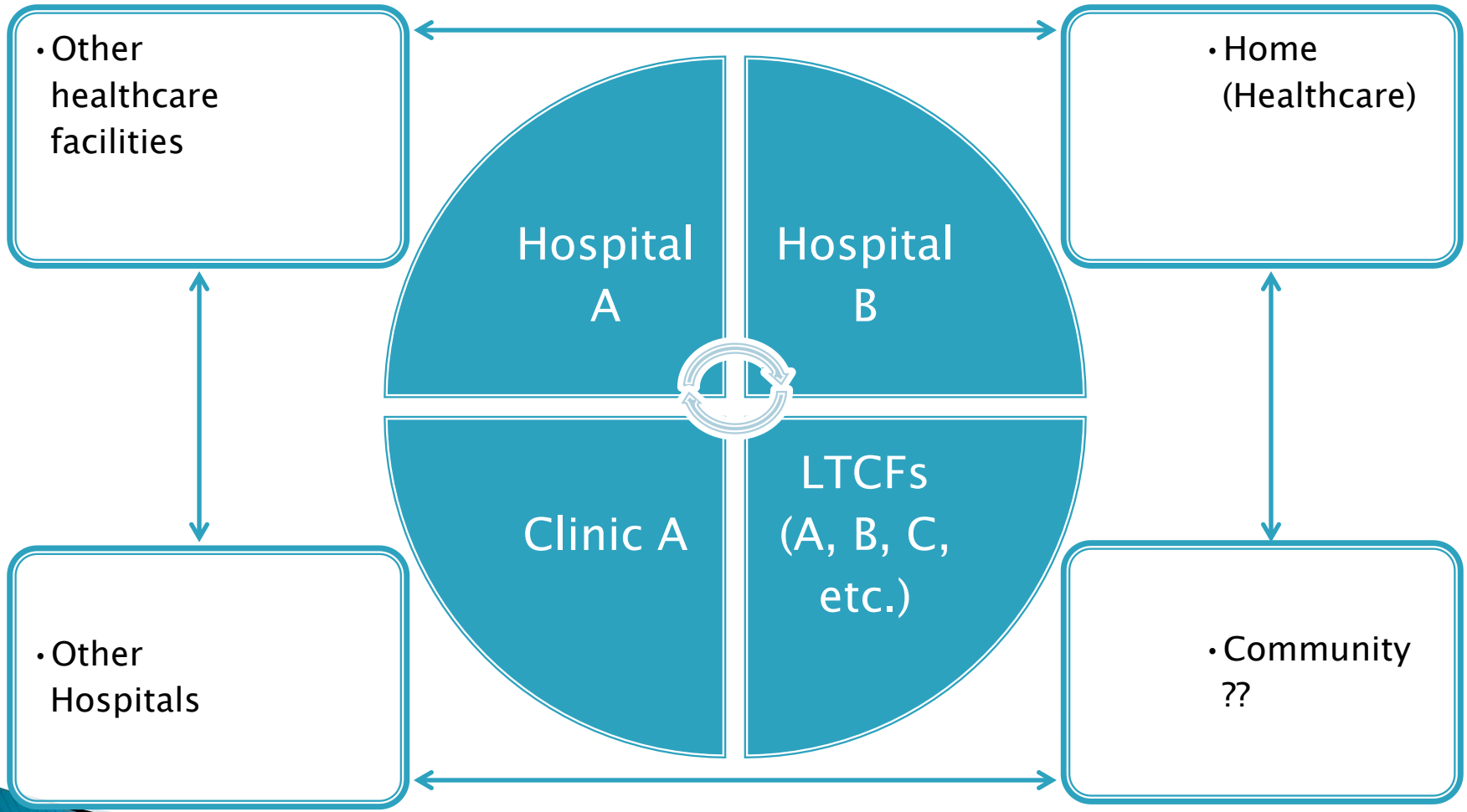
Recommendations

- Infection Control practices
  - Written policies and procedures
  - Hand hygiene and contact isolation → evaluate, educate and monitor compliance (accessibility & availability)
  - Dedicated equipment
  - Routine rounds of IPs with the staff and sharing outbreak progress and antibiogram
- Environmental cleaning
  - Evaluate cleaning of shared equipment
  - Educate and monitor compliance
  - Use new technologies for monitoring (fluorescent marker)
  - Clarify responsibilities for cleaning (who does what, when)
  - Written procedures

Recommendations

- Wound care
  - Written procedure
  - Train staff in wound care
  - Use single-use medications
  - Keep multi-dose containers out of the direct patient care areas
- Physicians, particularly IDs and those providing wound care to take leadership in managing this outbreak
- Surveillance culture and preemptive isolation of high risk patient (wounds and previous healthcare exposure)
- Regional meetings will be continued to share incidence of new cases and the follow progress of the outbreak
- Health officers of involved counties to communicate recommendations with each healthcare facility in their jurisdictions

Summary


• Other healthcare facilities
• Home (Healthcare)
Hospital A
Hospital B
Clinic A
LTCFs (A, B, C, etc.)
• Other Hospitals
• Community ??

Update on Fungal Meningitis Outbreak

Outbreak Identification

- Tennessee Department of Health identified a cluster of cases fungal meningitis[1, 2]
- Variety of common exposures
- All received epidural spinal injections of methylprednisolone acetate from New England Compounding Center (NECC)
  - 3 implicated lots
    - Recalled 9/26/2012

1Kainer, MA et al. Fungal infections associated with contaminated methylprednisolone in Tennessee. NEJM 2012 Nov.
[2] MMWR: Multistate Outbreak of Fungal Infection Associated with Injection of Methylprednisolone Acetate Solution from a Single Compounding Pharmacy – United States, 2012. Oct 12, 2012.

Situation Update Nationally

- 23 states received recalled steroids
- CDC laboratories confirmed presence of *Exserohilem rostratum* and two other types of fungus in 2/3 recalled lots as of October 22, 2012 which matches clinical culture
- As of November 14, 2012
  - 461 cases
    - 451 central nervous system-related infections
    - 10 peripheral joint infections
  - 19 states
  - 32 deaths

Situation Update
West Virginia Investigation

- Office of Epidemiology and Prevention Services (OEPS) notified of 1 facility in WV receiving recalled steroids

- Worked closely with physicians from the clinic
  - Updates on findings
  - Clinical guidance
  - Recommendations for notification

Situation Update
West Virginia Investigation

- 222 patients received recalled steroids
  - 101 who received joint injections
  - 110 who received epidural injections
  - 11 that received both
- 46 patients received further evaluation
- Zero cases to date
  - Slow growing organism
  - Mild symptoms
  - Risk is low but not zero

Acknowledgment

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Cynthia Whitt
Gina White
Andrew Root

WVOLS
Christi Clark

Partners
Daycare X
Hospital A
Hospital B
Clinic A
Pain Clinic

CDC
Matthew Biggerstaff
Scott Epperson
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